# Research Priorities for More Efficient Use of Critical Materials from a U.S. Corporate Perspective

Trans-Atlantic Workshop on Rare Earth Elements and Other Critical Materials for a Clean Energy Future

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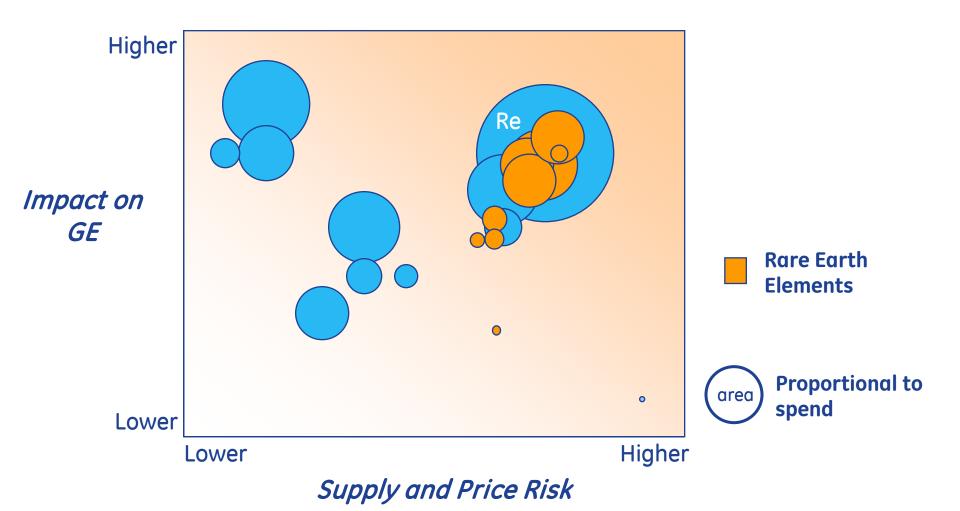
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# **GE Criticality Diagram**





## **OEM Technology Options in Addressing Metals Supply Challenges**

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#### Broaden material sources

Optimize usage

Redesign materials

#### **Sourcing**

- Volume material buys
- Diversification
- Hedging
- Global sourcing
- Strategic inventory reserves

#### Manufacturing

- Sort & categorize manufacturing scrap to maximize recycle
- Use of recycled materials
- Minimize use of atrisk process materials
- Near-net shape manufacturing processes

### **Engineering/R&D**

- Design for ease of recycling and re-use
- Material design to minimize at-risk elements
- Material substitutions
- System substitution

### Each element and each application will use a unique mix of options



# Research Approaches

#### Rare Earths

- Lighting
  - Recycling of fluorescent lamp phosphors
  - Development of phosphors with reduced RE content
- Permanent Magnets / Wind
  - Development of PM recycling approaches
  - Development of PMs with reduced RE content
  - System design solutions

#### **Tellurium**

- CdTe solar
  - Develop technology to reduce the CdTe layer thickness

